mostly relies on E-learning. Moreover, the scenario of e-learning use is different in developed and underdeveloped countries in the context of knowledge, application, advancement and resources. E-learning has been used in many developed countries in the past for decades. E-learning has become an essential part of teaching-learning process after the pandemic. In the present study the attitude of undergraduate students of public sector towards e-learning was explored.

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E-learning is increasingly being used to acquire knowledge in a worldwide setting. Accessibility and various online information motivate people to get active in learning through electronic resources. Governments took action to safeguard their citizens and economies in response to the mayhem that the COVID-19 outbreak caused. They also took immediate action regarding the use of digital technologies. The conversion of educational procedures to digital media is the most well-known of these initiatives (Agnoletto& Queiroz, 2020).

One has to keep in view the level of users with the technologies. A student develops deeper understanding and knowledge. For a system to be adopted and succeed, a friendly environment is necessary. This is only achievable if the students feel comfortable using technology (Masrom, 2007). It is believed that students'attitudes and views concerning e-learning, in addition to their contentment using technology and earlier e-learning experiences, will impact the achievement of e-learning future. Although E-learning prospects for underdeveloped nations have been researched in the literature, little is known about how users in those countries actually use it.

E-learning uses information technologies to transmit Information for training and education (Sun et al., 2008). E-learning has grown in popularity as a method of education in recent years (Benkovic & Dobrota, 2012). One of the biggest things to happen in the IT sector (Wang, 2003). Due to the fact it offers universities, lecturers, and students alike a simple, contemporary, and affordable answer (Motiwalla, 2007;Berman & Levine, 2008). In contrast to the most industrialized nations, where e-learning is popular and widely used, it is still relatively new in developing nations like Serbia (Damnjanovic, Jednak, & Mijatovic, 2015). The ability for e-learning to occur anywhere at any time, with asynchronous engagement, and with group collaboration are its most frequently mentioned advantages.

Davis suggested the Technology Acceptance Model (1989). The model investigates how perceived emotion affects the use of technology by people. It demonstrates the impact of perceived utility and perceived usability on consumers' perceptions of the usefulness of new technology, excluding normative assumptions and subjective norms. TAM asserts that consumers' attitudes about a given technology and their perceptions of its advantages influence their use of that technology (Davis et al., 1989). Additionally, the primary requirement for use of e-learning is intention towards it. Few studies have looked at the impact of various elements on perceptions of online learning (Liaw & Chen, 2007; Park et al., 2012).Numerous scholars have emphasized the significance of educational institutions regarding researching and reporting on students' attitudes about online learning (Cunningham, 2009; Iftcia; Rhema, 2014). In this study, researchers expanded the TAM theory with a further component that may influence attitudes towards e-learning. The requirement to introduce successful e-learning systems is therefore awareness of the user

characteristics in the creation and utilization of e-learning platforms in underdeveloped nations.

## Objectives

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Following major objectives of research study were to:

1. Identify the students' attitude towards e-learning at higher education level.
2. Determine the differences among male and female students' attitude towards e-learning at higher education level.
3. Investigate students' attitude about e-learning among public universities and private universities.
4. Examine the students' attitude towards e-learning among faculties/departments.
5. Analyze the effect of stress on e-learning practices and attitude of students at higher education level.
6. Appraise the effect of technology support on e-learning practices and attitude among students at higher education level.

### Hypotheses

Ho1: There is no significant difference among male and female students' attitude towards e-learning at higher education level.

Ho2: There is no significant difference in students' attitude towards e-learning among public and private universities.

Ho3: There is no significant difference in students' attitude towards e-learning based on faculties/ departments.

Ho4: There is no significant effect of stress on e-learning practices and attitude of students at higher education level.

Ho5: There is no significant effect of technology support on e-learning practices among students at higher education level.

### Theoretical Framework

Technology Acceptance Model (TAM) was taken to assess the students' attitudes towards e-learning acceptance at the higher education level. This is used widely in numerous information systems and information technologies (Chen et al., 2012). Determinants of Perceived Usefulness, Ease of Use, Intentions to Use, Actual Intention to Use, and Attitude toward E-Learning were taken which make the basis for the present research. Two external factors i.e., Stress and Technological Support were also considered.

In the last decade, interest has developed in the adoption or acceptance of information technology (IT). To explain the acceptance behavior of end consumers, several theoretical models have been put forth. Among them, one of the most popular and scientific models for illuminating user acceptance behavior is Davis's (1989) technology acceptance model (TAM). This paradigm is rooted in theory of social psychology and the Theory of Reasoned Action (TRA) (Fishbein, &Azjen, 1975). Beliefs influence attitudes which in turn have an impact on intentions and conduct as contended by TRA. In the past decade, TAM

has shown empirical support and attracted researchers' interest (Taylor & Todd, 1995). TAM has also been expanded in several research studies by the inclusion of new factors such as self-efficacy, gender, experience and culture, and. Generally, evidence showed that TAM is reliable, valid and economical (Venkatesh & Davis, 2000). The academia will be able to develop and implement suitable models and forms of online learning to satisfy the needs of the students with the aid of knowledge of students' attitudes and viewpoints. According to other researchers, the learners' viewpoints and attitudes toward online learning play a significant role in how well they learn (Sanders,2001; Alomyan ,2008).

## 2. Literature Review

E-learning has become a widespread technology because of the advancement of various technologies, and it has made significant progress toward being acknowledged as theory and as a fresh method for knowledge acquisition with regard to teaching and learning. E-learning has begun to take off in several developing nations, where technology has the potential to assist satisfy rising educational demand and report the shrinking pool of qualified trainers (UNESCO, 2006).Many academics concur that ICTs are facilitating today's educational institutions and processes in an increasingly significant way (AL-Hunaiyyan, et al,.2008).However, other difficulties continue to exist. The active and engaged students that interactive learning demands are uncommon in those nations, and traditional methods of teaching and learning are frequently employed (Andersson & Grönlund, 2009; Evans, 2005).

Utilization of computers in educational settings in underdeveloped nations has expanded over the past few decades (Trucano et al,.2012). The lack of access to technology in Pakistan severely limits the pupils' ability to use ICTs (Hussain. 2007). Numerous studies found link between comfort in using computers and favorable computer experiences,favorable attitudes and skills (Papaioannou & Charalambous, 2011).Understanding student attitudes, according to Chen and Huang (2012), can help e-learning systems work more broadly and better satisfy students' requirements. This should increase the effectiveness of learning and raise students' levels of satisfaction with the learning process. Other research challenged these results, arguing that exposure to computers did not significantly contribute to the formation of favorable computer views (Felton, 2006; Olatoye, 2009). About 126 Pakistani students enrolled in higher education were interviewed by Adnan and Anwar 2020, who discovered that most of them had generally favorable opinions about online learning.

Users' perceptions of how simple it is to adopt a system are reflected in its usability (Davis et al., 1989).In this study, we discussed the creation of a tool for measuring attitudes toward online learning. Three variables that affect students' attitudes about e-learning have been discovered. These elements include the design, usability, and usefulness of e-learning. According to our research, students will have a more positive opinion of an e-learning system if they feel it to be more practical, simple to use, and appealing to the eye. Therefore, in accordance with Davis's TAM theory (Davis et al., 1989), it is anticipated that students will use e-learning systems if they have a more positive attitude. Our results are consistent with earlier research that demonstrated how Davis's TAM theory may be used to

explain why e-learning is accepted (Masrom , 2007; Roca et al., 2006). We discovered that views about e-learning were highly influenced by its usability and convenience of use, which supported earlier research (Teo & Milutinovic, 2015; Teo et al., 2016). These findings corroborate those of other research (Roca et al., 2006; Masrom,2007; Park, 2009) that highlighted the TAM theory's potential for fostering e-learning acceptability and use intentions. Furthermore, research studies also support the value of interactive experiences throughout designs that offer rich sensory experiences and responses to learners' activities (Damnjanovic et al., 2015).Although this study is one of the few to apply the TAM theory to e-learning in Serbia, it has significant drawbacks that should be considered. Lack of repeated investigations to check for factor structure invariance across several cohorts was the biggest flaw in the study. The homogeneous character of the sample was another drawback. These findings should be replicated with a population that is more diverse in the context of age, socioeconomic status, education, and job (i.e., non-student) history. Doing so would help us better understand the factors that influence attitudes towards e-learning. Confirmation of concept convergent and discriminant validity was also lacking in this investigation. A future study involving structural equation modelling will be conducted on this.

The learning experiences and attitudes become more favorable when systems are simpler to use regarding e-learning. As a result, it makes it more likely that e-learning will be used again in the future (Arbaugh, 2002). A significant number of scholars concur that effective and successful learning requires interactive instructional design (Hong, Lai, & Holton, 2003)). According to Sharma et al. (2007), usefulness is a crucial component in improving students' ability to self-regulate environment ofe-learning, which may improve their intent to utilize e-learning. Usefulness is a quality or attribute that reflects how simple human-computer interfaces are to utilize (Kneebone, 2003).By recognizing strong positive associations between ease of use and students' positive attitudes about e-learning, provide solutions that are in line with their findings. The relationship between e-learning and students' attitudes outcomes and positive learning experiences highlights the transcendental compact of e-learning.Anwar and Wahid (2021) did a study with the aim ofgetting a better understanding of learners' perceptions of online learning. Students' good attitudes about online learning, according to Selim (2007), are essential for their preparation and inclusion in distance learning. Insufficient access to ICT limits students' talents, attitudes, and experiences, according to Sweeney and Geer (2010). According to Workman (2005), people are more inclined to employ a certain technology when they have positive sentiments regarding it.

Yacob (2012) and colleagues looked at student perceptions of e-learning at Malaysia's TATI University College. On the opinions of the pupils in reference to demographic variables i.e.gender, faculty academic year,technology usage, and awareness of e-learning deployment, multiple regression analysis was done. The findings indicate that both men and women at TATIUC are significantly responsiveto e-learning in the classroom. On the students' perceptions in relation to gender, academic year, faculty, technological knowledge, and e-learning deployment awareness, multiple regression analysis was done. The findings indicate that both genders at TATIUC are significantly aware of e-learning in the classroom.

In the Iranian province of Khuzestan, Mehra and Omidian (2011) observed factors that make an impactlearners'readinesstowardsadaptation to e-learning. Theoutcomes support the five elements that can be used to simulate students' attitudes toward e-learning. These are desire to utilize online learning, the perceived value, perceived simplicity of usage of online learning, the force to use online learning, and the accessibility of online learning resources.

In a research study, students reporteda tough time for access to ICT facilities, which hindered their capacity to use technology, according to Hussain (2007). Many students useInternet cafes for academic purposes due to lack of access to personal internal connections. The usefulness of using e-learning, the student level of computer proficiency, and the quality and perceived usability of online courses, all have an impact on students' opinions (Aixia&Wang, 2011). In turn, student acceptability and readiness for e-learning depend greatly on their views regarding e-learning (Lim, Hong, & Tan, 2008). According to Aixia and Wang (2011) substantial mainstream learners who expressed satisfaction with the online learning atmosphere had satisfactory views and beliefs about it. It has been determined that student attitudes regarding e-learning are crucial to its performance (Bhuasiri et al., 2012). Oraifand Elyas (2021)research indicates that there was substantial participation in the online class. The acceptance and readiness of students for e-learning is dependent on their positive views toward it (Lim, Hong, & Tan, 2008). Aixia and Wang (2011) reported in their research study that students who were happy with their experience in an online learning environment had favorable attitudes and beliefs about it. According to Bhuasiri et al.(2012) student attitudes about e-learning are crucial for its success. The results of Oraif and Elyas show that there was substantial participation in the online course. Many students had good attitudes regarding e-learning, according to Nassoura (2012), because it improved their motivation and self-esteem. Although university students in poor nations have different opinions about e-learning, in general, they have favorable opinions. However, according to Deb (2011), the learner's perceived isolation because of the physical distance between them and the instructor often results in unfavorable sentiments. Students' views toward e-learning are influenced by traits such as computer and Internet efficacy, computer anxiety and experience (Chu & Chu, 2010; Chiu & Wang, 2008; Sun et al., 2008;).These studies supported earlier research findings published in the literature by demonstrating that student technology proficiency work as strong predictor of students' attitudes toward e-learning and ICT (Liaw & Chun, 2007; Liaw & Huang, 2011). Jalilinia (2021) study results showed that most students didn't like and support online learning. According to research, there are strong connections between attitudes, beliefs, and behaviours, and attitudes serve as the basis for beliefs that have an impact on behaviours (Siragusa, 2011).

Javier (2020) explored that the respondents' level of technical expertise was respectable. In addition, students having technological skills showed positive opinions regarding online education. According to Erarslan and Zehir Topkaya's(2017) research, L2 learners had favourable attitudes regarding e-learning.

Research works were conducted to look into the impact of gender, age group and number of study years on student behaviour towards e-learning. It has been shown in the literature that gender contributed significantly to understanding the differences in

experiences about the effectiveness of technology (Roca, Chiu, & Martinez, 2006; Bertea, 2009). Additionally, demographics (gender and age) and computer proficiency (ownership of computer, time span of using computer, training, intensity related to use of computer use, access to a computer,) have been divided into two groups to examine approaches concerning ICT of teachers, pupils and principals (Wen & Shih, 2008;Papaioannou & Charalambous, 2011). I would advise it for their upcoming academic years. According to Rhema et al. (2014), both male and female students had generally similar favourable opinions about ICT and e-learning. Additionally, when examining the same subject, (González-Gómez et al. 2012) found that female students tended to be more gregarious online, which has benefited them more than boys and has increased their satisfaction with utilizing VLEs. (Rovai and Baker 2005) tended to concur as well.

Male and female secondary students had varied attitudes regarding e-learning, according to (Bhubneswari et al.,2012). In recent years, experts have even asserted that, when considering social aspects, the learner's age and gender do play much more significant roles than previously believed (Mazman 2011; Jan, Lu, &Chou, 2012). Due to differences in moderating characteristics like age, gender, and experience, problems appear to worsen when systems are not designed with the learner perspective in mind (Nawaz 2013). According to Alkhunaizan and Love (2013) satisfaction with e-learning is strongly correlated with gender and age.

Female scholars were more inclined towards the usage of ICT in comparison of male scholars (Egbo et al., 2011). Several researches, however, showed that male scholars were in more favor of e-learning as compared to females (Liaw & Huang, 2011). Suri and Sharma (2013) observed no gender difference related to use of e-learning. These findings are consistent with previous research that showed the gender difference is getting smaller (Bhattacharjee, 2008; UNESCO, 2012). Indian postgraduate students had a very good attitude toward e-learning (Adewole, 2014)

Rhema et al. (2014) discovered that when it came to the gender effect, both male and female students had generally similar favourable opinions about ICT and e-learning. This is consistent with Hussein's (2011) conclusions, which showed the difference in opinions of students of both genders in Saudi universities.

## 3. Methodology

A quantitative research approach with descriptive research methods was employed for conducting the present research. Research questionnaire was designed by researchers focused on the Technology Acceptance Model (TAM) given by Venkatesh & Davis in 1996.

### Population, Sample Size and Sampling Technique

Students of Public and Private Universities in Islamabad were the population of the current research study. Two public universities with two private universities were selected to draw the sample size. In total 375 students from public universities and 361 students from private universities participated in the research. Disproportionate stratified sampling technique was employed for collecting data. Two strata were public and private universities.

### Instruments Details, Reliability and Validity

The questionnaire consisted of 22 question items based on categories of "Ease of Use, Perceived Usefulness, Actual Intention to Use, Intentions to Use, Stress, Technological Support and Attitude toward E-Learning". Two experts from the relevant field assessed the questionnaire. Thirty-five students were selected for pilot testing and Cronbach's Alpha value was .903 which showed excellent reliability and internal consistency of the questionnaire. Data was collected through sharing Google Forms and personal visits.

### Data Analysis

**Table 1:** Descriptive Analysis of Students' Attitude towards E-Learning at Higher Education Level

| Variables | Mean | Results |
|---|---|---|
| Perceived Usefulness | 3.93 | Agree |
| Ease of Use | 3.79 | Agree |
| Intentions to Use | 3.43 | Undecided |
| Actual Intention to Use | 3.65 | Agree |
| Stress | 3.4 | Undecided |
| Technological Support | 3.57 | Agree |
| Attitude towards E-Learning | 3.74 | Agree |

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Table 1 is regarding students' attitudes toward e-learning at higher education levels. Results showed that students responded in the category of 'Agree' regarding perceived usefulness, ease of use, actual intentions to use, technical support and attitude towards e-learning. Moreover, students responded in the category of 'Undecided' intentions to use and stress. Overall results showed that students show a positive attitude about e-learning acceptance in majority of the categories of e-learning except intention to use and stress.

**Table 2:** Comparative Analysis of E-Learning Attitude among Male and Female Students at Higher Education

| | Gender | | t | df | sig | Cohen's d |
|---|---|---|---|---|---|---|
| E-Learning Attitude | Male N=394 | Female N=342 | 4.59 | 734 | .000 | .324 |
| | M (SD) | M (SD) | | | | |
| | 3.82 (.425) | 3.66 (.502) | | | | |

Results of table 2 showed that a significant difference was found between male and female attitudes toward e-learning. Furthermore, findings also showed that both male and female students have positive attitudes toward e-learning. However, male students were found higher levels of positive attitude towards e-learning compared to female students.

**Table 3:** Comparative Analysis of E-Learning Attitude among Students of Public and Private Sector at Higher Education

| Variable | Universities | | t | df | Sig | Cohen's d |
|---|---|---|---|---|---|---|
| E-Learning Attitude | Public N=375 | Private N=361 | | | | |
| | M(SD) | M(SD) | | | | |
| | 3. 75 (.469) | 3.74(.463) | .398 | 734 | .691 | .0214 |

Results of table 3 showed that there is no significant difference in the students of public and private universities regarding attitudes toward e-learning. Both sector students have positive attitudes towards e-learning.

**Table 4:** Comparative Analysis of E-Learning Attitude among Students of Various Departments at Higher Education Level

| | Students of various Faculties / Departments | | | | F | sig | $\eta^2$ |
|---|---|---|---|---|---|---|---|
| E-Learning Attitude | Social Sciences | Management Sciences | Engineering | Languages | | | |
| | M(SD) | M. (SD) | M. (SD) | M. (SD) | | | |
| | 3.67 (.301) | 3.93 (.393) | 4.47 (.425) | 3.09 (.118) | 257.6 | .000 | .520 |

Results showed a significant difference among students of various departments/faculties at higher education levels. Moreover, engineering and management sciences students showed a higher level of positive attitude towards e-learning. However, the intensity of positive attitude was found less in the students of languages departments.

**Table 5:** Effect of stress on students' attitude towards e-learning at higher education level

| Constructs | B | SE. B | β | t | $R^2$ | p | Hypothesis |
|---|---|---|---|---|---|---|---|
| Stress ->E-Learning | -.678 | .012 | -.908 | -58.8 | .825 | .000 | Ho4: Not Supported |

Results showed that there is a significant and negative effect of stress on students' attitudes towards e-learning. Stress brings 82.5 % variation in the attitude of students towards e-learning. Moreover, one unit increase in stress will decrease 0.678 units in the e-learning attitude of students.

**Table 6:** Effect of technological support on students' attitude towards e-learning at higher education level

| Constructs | B | SE. B | β | t | $R^2$ | p | Hypothesis |
|---|---|---|---|---|---|---|---|
| Technology Support- > E-Learning | .695 | .006 | .974 | 116.6 | .949 | .000 | Ho 5: Not Supported |

Results showed that technological support has a positive and significant effect on the students' attitude towards e-learning at the higher education level. Technological support brings 94.9 % variation in the attitude of students.

## 4. Discussion and Conclusion

Present research was carried out to analyze the factors affecting students' attitudes about e-learning acceptance at the higher education level. A total of 736 students from two public and two private universities in Islamabad participated. Results showed that students show a positive attitude regarding e-learning acceptance. One possible reason for having a positive attitude toward e-learning may be that they can access the material easily even from home. As Ninsiana et. al (2022) said in distance e-learning students have the comfort of taking courses from their homes and accessing learning material anytime.

Chikileva et al (2023) in their empirical review studies examined e-learning effect on academic achievement in university students. They concluded that e-learning impacts positively the achievement of students which supports the present research study. However, Universities are required to equip their teaching faculty with teaching strategies, pedagogical principles, and technological skills which are compulsory for successful e-learning settings.

Moreover, a significant variation was found among male and female learners' attitudes toward e-learning acceptance. Both male learners and female learners demonstrated positive attitudes toward e-learning acceptance. However, male students show a positive attitude towards e-learning acceptance as compared to female students. Yu and Deng (2022) in a meta-analysis study of gender variations and e-learning outcomes identified that gender is not cause of bringing change in learning outcomes due to e-learning which contrasts with the present research. However, in their further analysis, they explored that in various countries such as Spain, India, UK, and Austria females have a positive attitude as compared to males towards e-learning. Yacob et al (2012) in their research explored that both men and women are responsive to e-learning and are aware of e-learning in the classroom. Bhubneswari et al (2012) in their research studies explored that male and female secondary school students had varied attitudes regarding e-learning.

Findings also conclude that both public and private university students have positive opinions concerning e-learning acceptance and no significant differences exist in the context of sector. Research study conducted by Lucero et al. (2022) regarding e-learning readiness among students and teachers in private and government higher education supported the present study results which show no difference among these sectors regarding the acceptance of e-learning. Results showed a significant difference among students of various departments/faculties at higher education levels. Moreover, engineering and management sciences students showed a more positive attitude towards e-learning. However, intensity of positive opinion was found less in the students of languages departments.

Results showed that there is a significant and negative effect of stress on students' attitudes towards e-learning. Aslam, Moghal, and Manzoor (2023) worked on math education in the online learning environment and linked it with learning anxiety. These results support the present research that e-learning may cause stress among students. The findings of the present study showed that technological support has a positive and significant effect on the students' attitude towards e-learning at the higher education level. Al-fraihat et al. (2020) make a case that supports the results of the present research that

due to amalgamation of technology sector of education has grown quickly and works for the elevation of e-learning.

## 5. Recommendations

Following recommendations may be helpful for developing students' attitudes regarding e-learning acceptance at the higher education level:

1. E-learning practices may be enhanced among students by providing training to students concerning e-learning applications at the higher education level.
2. Female students may be encouraged more about use of e-learning practices.
3. Training may be provided to students of all faculties regarding perceived usefulness and use of e-learning.
4. Stress levels may be reduced using e-learning through encouragement and positive reinforcement.
5. Technology acceptance may be encouraged among university students by providing competencies in use of e-learning.

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